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ABSTRACT

In the course of a longitudinal research program conducted in Sweden, data were being collected on biological and psychological aspects of individual functioning and on environmental factors for a fairly large representative sample (approximately 1,000) of Swedish males and females between 10 and 27 years of age. Based on data from the longitudinal study, this report focuses first on relationships between males' conduct, school age, adult criminality, and physiological factors. Findings indicated that aggressiveness at school age is highly predictive of later criminality, whereas the absence of aggressive tendencies at an early age is strongly related to the absence of criminal offences at adult age. When aggressiveness at age 13 was related to adrenaline excretion at the same age, a significant negative correlation was obtained. Significant and substantial differences between criminals and non-criminals were found in mean adrenaline excretion at school age. Subsequent analysis of early aggressiveness and motor activity as predictors of adult criminality found that motor activity was a stronger factor than aggressiveness per se. (RH)

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Main Theme

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Conduct, Biological Factors and Adult Delinquency in a Longitudinal Perspective

David Magnusson

Under the title of 'individual development and environment', a longitudinal research programme was initiated in the 1960s at the Department of Psychology at the University of Stockholm. The general frame of the project is to investigate how personal and environmental factors – indenpendently and jointly in interaction – operate and influence the course of development from childhood to adulthood with particular emphasis on social adjustment in adulthood. Within this general frame, main subprojects are directed to the study of aspects of the developmental background of alcoholism, criminality and mental illness. In view of the important role that the individual's educational-vocational career process and his/her social network play in the development, they have been given special attention. (For information about the programme, its main aims, strategies and data collection, the reader is referred to Magnusson, 1981; Magnusson and Dunor, 1981; and Magnusson, Dunor and Zetterblom, 1975).

The frame of reference for the study of social development is the view that the individuals develop in a continuous and bi-directional interaction with the environment as manifested in their physical, social and cultural characteristics. Within the limits of his/her somatic predisposition that each individual develops in this interaction with the environment, a way of understanding, interpreting and dealing with the external world that is partly specific for him/her emerges (Magnusson, 1978; 1981).

The approach of human development as a process of continuous interaction between an individual and his/her environment implies that behaviour cannot be understood satisfactorily without considering personal and environmental factors simultaneously for each individual. This view

has been a leading principle in the planning and carrying through of the research programme.

Initially, the research programme comprised all boys and girls of ages 10 and 13 who attended school in a town in the middle of Sweden. The main group (those who were aged 10 at the start) comprised about 1,000 children equally distributed between the sexes. The boys and girls represent the entire range of intelligence and social background, and the empirical comparisons show that the group is fairly representative of the corresponding group of males and females in Sweden. Using the older age group (those who were 13 at the start) as a pilot group for testing research strategies and methods, and for control of age cohort defects, the main group has been followed continuously from the beginning of 1965. On the personal side, psychological factors like *mediating variable* (such as intelligence, creativity, interests, attitudes, norms and values), *manifest behaviour* (such as aggression, hyperactivity, criminality and alcohol consumption), *social relationships* (with parents, peers and adults in general) and *somatic factors* (brain activity measured by EEG, hormanal activity and physical capacity) have been included. On the environmental side, most of our interest has been devoted to the family condition (parents' education and income, family relations, family norms, family activities, etc).

Data for most of the factors have been collected by using methods which permitted group administration of intelligence tests, inventories, etc. Intensive studies have been performed on selected samples of individuals when the needed information required methods that must be applied to one individual at a time (interviews, observations, physiological measures such as EEG, etc). Intensive studies have been conducted both with representative samples and with groups of individuals who are homogeneous in some important respects, e.g. those individuals who were strongly neglected or rejected by their peers at an early age.

All students who had been in the school system and belonged to the age group under study were added to the main group. A comprehensive follow-up has taken place during the last two years at the age of 26 to 28. Then, all those who have participated at least once in our earlier data collection were regarded as the total population. They comprised 1,360 individuals. Data collection in the follow-up study attempted to cover the life situation of the individuals. It included self-reports on working life, family life, leisure-time activities, educational and vocational career, further plans, perceived control of one's life, social support and social networks, alcohol habits etc. A sample of 250 individuals who have been the object of special interest during the entire programme also took part in a two-and-a-half-hour interview, a two-and-a-half-hour test session and a medical examination, particularly directed to the study of various aspects of hormonal functioning. Of particular interests in the follow-up study are all the register data that we have access to. We have now collected all data at the local and at the national level for registered alcohol problems and

for criminal acts. We have also collected the journals from all the psychiatric clinics in Sweden and in this way, we have covered the psychiatric history of all our subjects.

At this stage of the longitudinal research programme, data are available on biological and psychological aspects of individual functioning and on relevant environmental factors for a fairly large representative sample of males and females from the age of 10 to 27. The data will be used primarily to investigate problems concerning individual development within the frame of reference briefly presented above.

PURPOSE OF THE PRESENT REPORT

Here, data presented reflect the relationships between conduct, school age, adult criminality and physiological factors. The report will deal with this problem for the male group.

DATA

The two *conduct* variable dealt with here are aggressiveness and motor activity. At the ages of 10 and 13, all pupils were rated by their teachers on a seven point scale with respect to seven factors, among which were aggressiveness and motor activity. The ratings were given by different teachers at the two-age stages. The stability of the ratings was surprisingly high in line with what has been reported by other researches (see Magnusson, Stattin and Dunor, 1983).

Data for *registered crimes* were collected from all central and local registers in Sweden and cover all crimes for which a person has been prosecuted and convicted. The registered data reported here cover the age period from 18 to 26.

The *physiological factor* dealt with here is adrenaline, used as a general indicator of the individuals' level of physiological activity. Excretion of adrenaline in the urine was measured for a sample of about 100 boys and 100 girls at the age of 12–13. Urine was collected under two conditions at school – a film session and an examination – here denoted passive and active conditions.

Whether traditional psychodynamic theory, modern social learning theory or more eclectic approaches to criminality are considered, there seems to be a convergence among researchers that aggressiveness constitutes an important component of early socially maladaptive behaviour. Different labels interconnecting aggressive behaviour and delinquency have been employed such as "the unsocialised aggressive' (Jenkins and Boyer, 1968), 'asocial aggressive' (Warren, 1971), 'frustrative-impulsive aggression' (Roth, 1982), and 'the aggressive, antisocial reaction pattern' (Olwaus, 1978). Though probably hereditary influences may play a part by determining activity level and basic temperament, the main root of aggression has been claimed to be found in the upbringing environment. Early emo-

tional deprivation has been stressed recurrently (Bandura and Walters, 1959; Bowlby, 1965; Ross, Hammond and Mulligan, 1966; Farrington, 1978; Glueck and Glueck, 1951; Langner, 1979; McCord, 1979; Robins, 1965). The person's aggresive behaviour tendencies are conceived of as an emotional defence to disturbed close relationships – deprivation of parental love and affection through separation, punitive attitudes, neglect and rejection – such that hostility and mistrust gradually become typical for his or her general way of relating to others.

A review of the literature showed seven long-term studies which have tried to estimate the prognostic utility of early aggressiveness for later delinquency. The studies differ considerably as to the methods used for data collection, the age points at which the measure of aggressiveness is obtained and the prediction interval for delinquency. Three of the studies cover age-homogeneous populations (West and Farrington, 1973; Mavighurst *et al.*, 1962; Mulligan *et al.*, 1963). Three studies employ selected clinical populations (kirkogeard-Sorensen and Madnick, 1977; McCord, 1982; Mitchel and Rose, 1981). In one study, only girls are followed-up subjects (Feldhusen, Thurston and Bezning, 1973). Despite these differences between studies, there emerges some concern themes. There is roughly three times as many future delinquents among high-aggressive than among low-aggressive subjects. Nearly half of the delinquents have been rated as highly aggressive in earlier years in comparison with one out of six of the conform subjects.

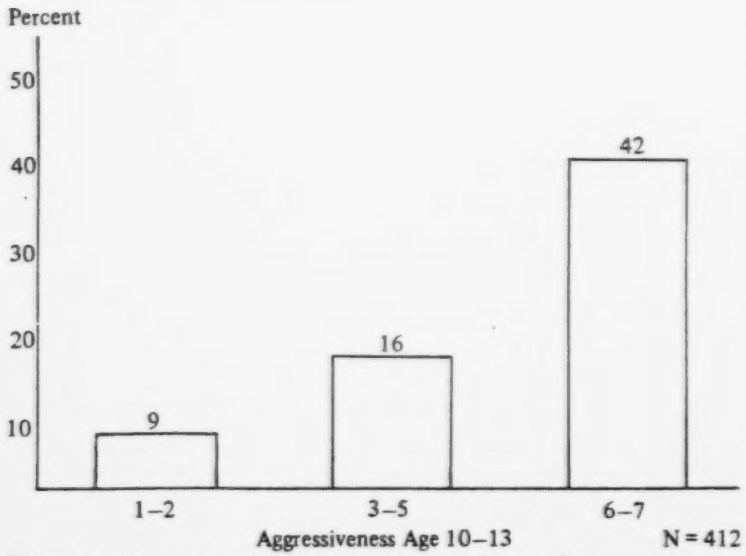

Figure 1: Aggressiveness of Adolescents Aged Ten to Thirteen Years

In Figure 1 are given the percentages of individuals with different aggressiveness scores at school age who have committed one or more crimes at adult age. It can be seen that aggressiveness at school age is highly productive of later criminality. The absence of aggressive tendencies at an early age is strongly related to the absence of criminal offences at adult age.

When aggressiveness at age 13 was related to adrenaline excretion at the same age, a significant negative correlation was obtained. Boys who were rated as highly aggressive had a significantly *lower* level of adrenaline excretion than boys who were rated as low in aggression. This was valid both under passive and active conditions.

Then a natural interest is in the relation between adrenaline excretion at age 13 and criminality at adult age. This relation is shown in Figure 2.

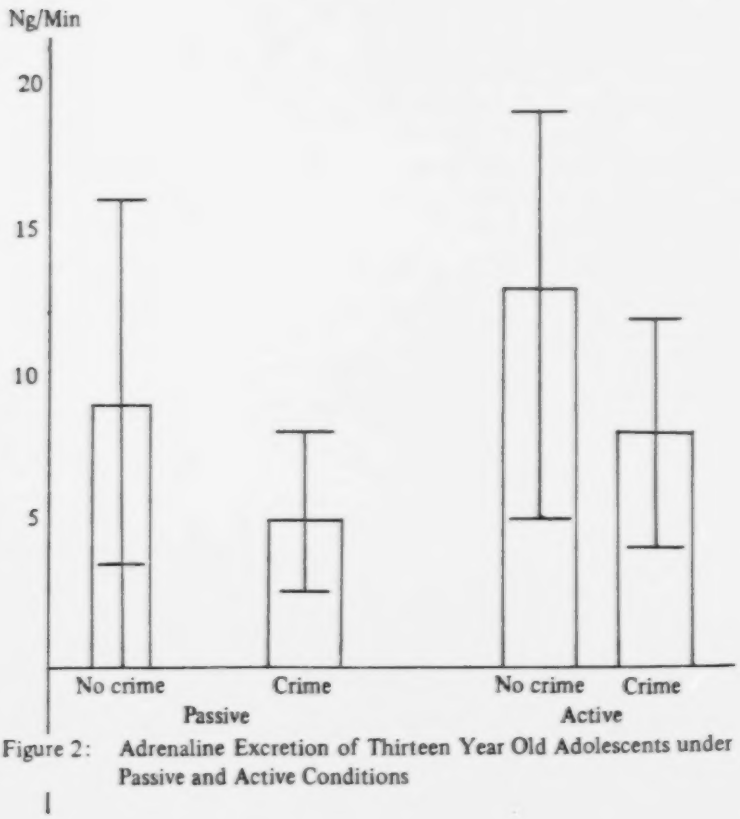

Figure 2: Adrenaline Excretion of Thirteen Year Old Adolescents under Passive and Active Conditions

It should be observed that adrenaline excretion is measured at age 12–13 and criminal offences cover the age period between 18 and 26. Given this long interval, the differences in mean adrenaline excretion between those who have committed crimes and those who have not are surprisingly high. They are not only significant but also substantial.

EARLY AGGRESSIVENESS AND MOTOR ACTIVITY AS PREDICTORS OF ADULT CRIMINALITY

So far, our results are in accordance with what has been obtained in psychophysiological laboratory research during the last decade. However, the interpretation of the results presented above as supporting the common assumptions in criminological theories about aggressiveness as the important factor in the etiologs of adult criminality can be questioned. Recent research on conduct problems, in a wide sense, suggests that two main components can be discerned: an aggressive component (as seen in destructive behaviour, fighting, daring, quarrelsomeness, etc.) and hyperactivity (restlessness, concentration difficulties, motoric overactivity, etc.). Although interrelated, these two components have been found to constitute separate dimensions in factor analytical studies on conduct problems, and also to have somewhat different future implications and different etiology (c.f. Milich and Loney, 1979; Stewart, Cummings, Singer and WeBlois, 1981; Langhorne and Paternite, 1978).

The hyperactivity-aggressiveness distinction is of particular theoretical interest, not least in criminological research. For example, aggressiveness has been considered in the main approaches to personality as the primary early risk factor for delinquency. In psychodynamic theory, aggression has in some cases been considered as almost tantamount with delinquency: both being so called alloplastic symptoms (Eissler, 1949) or destructive forces that are directed towards others and the external reality. On the other hand, within the hyperactivity phenomenor, aggression is included as a secondary factory. That hyperactivity can be linked to delinquency has been discussed earlier on (Robins, 1965; Offord, Sullivan, Allen and Abrams, 1979).

These findings, together with neurophysiological research on hyperactivity showing systematic relations with physiological reactivity, led us to the following questions: if ratings of aggressiveness might reflect not only genuinely aggressive tendencies but also activity level of the individuals, it should be showed that there is a rather high correlation between teachers' ratings of aggressiveness and their ratings of motoric activity. Then, which is the important aspect of the ratings of aggressiveness and motoric activity respectively, that is related to physiological reactions and predictive of later criminality? Is it aggressiveness with motoric activity partialled out or is it activity with aggressiveness partialled out? Or is it a specific constellation of the two?

The questions were studied in a way that is shown in Tables 1 and 2. In Table 1, the percentage of individuals who have committed crimes during the period of 18 to 26 is shown for (a) those who were neither rated as highly aggressive nor as highly active (cell A) (b) those who were rated as very aggressive but not highly active (cell B) (c) those who were rated as highly active but not highly aggressive (cell C), and (d) those who were rated as both highly aggressive and highly active (cell D). As can be seen from Table 1, activity is the stronger single factor. The really strong criminality is obtained for those who were rated as high in both aggressiveness and motor activity at the age of 13. Out of 60 boys in that group, 35 (58%) have committed a crime at adult age.

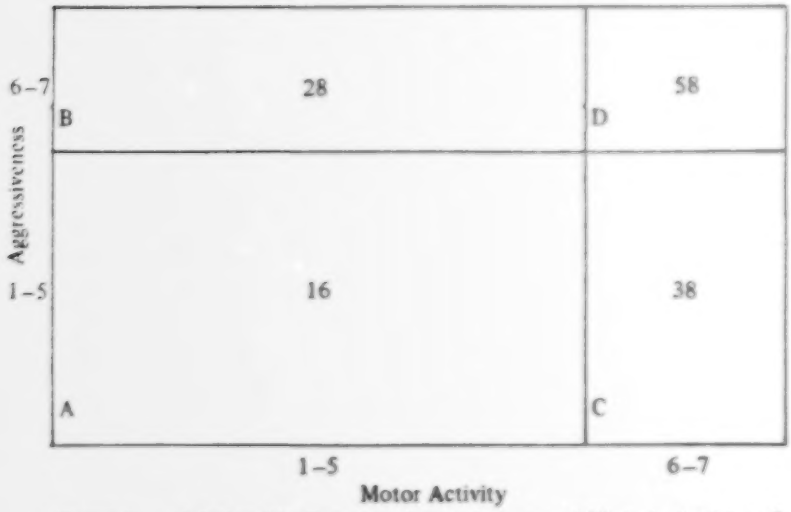

Figure 3: Relationship Between Aggressiveness and Motoric Activity of Individuals Who Committed Crime at Adult Age

The next step was to go back to the study of adrenaline excretion as the dependent variable for aggresiveness with motor activity and motor activity with aggressiveness partialled out. The result is shown in Table 2.

The number in the cells for aggressiveness and activity as pure factors is small and the results should be taken as indicative rather than decisive. However, the tendency is clear. For ratings of aggressiveness with activity partialled out, the adrenaline excretion is actually higher than for non-criminals. Boys who are rated as highly active without being aggressive have significantly lower adrenaline excretion compared with the controls and at about the same level as those who are both aggressive and motoric active.

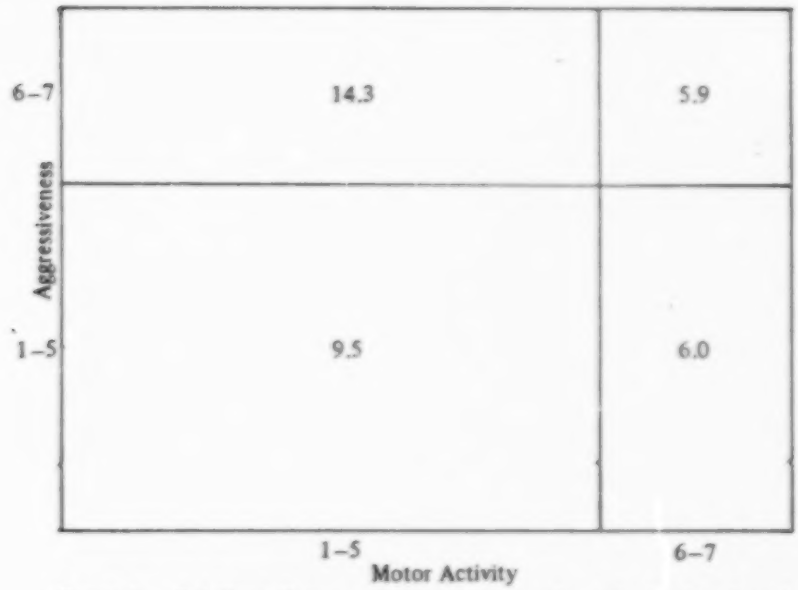

Figure 4: Relations Between Adrenaline Excretion (Passive Condition) and Aggressiveness of Individual Who Committed Crime at Adult Age

Thus, the results of the calculation for adrenaline excretion is in line with those for criminal offences: motor activity is a stronger factor than aggressiveness *per se*.

COMMENTS

The first part of the results presented has been reported and discussed earlier on (Magnusson, Stattin and Duner, 1983). The last part in which aggression and motoric activity have been separated is the result of very recent calculations. We are now discussing the possible interpretations of these results in the frame of reference given by results from research on hyperactivity (with miniral brain damage, attention deficit disorder, personality disorders etc.) and impulsiveness. We are also planning further research in order to elucidate the complex development process in which psychological and biological factors interest with each other and with environmental factors. With access to data for personality factors, registered alcohol abuse and psychiatric journals, and to data for crucial hormones and neurotransmittors from blood and urine at adult age, we hope to be able to contribute to some understanding of that process.

Aggressiveness

(1) They are aggressive against teachers and classmates. They may, for example, be impertinent and impudent, actively obstructive or incite to rebellion. They like disturbing and quarelling with classmates.
(2) They work in harmony with the teacher and have positive contacts with classmates. Their relation to others easily become warm and affectionate.
Most children are between these two extremes.

Motor Activity

(1) They find it very diffficult to sit still during lessons. They fidget uneasily in their seats or wish to move about in the classroom, even during lessons. They may also be talkative and noisy.
(2) They have no difficulty at all in satisfying event great demands on silence and quietness.
Most children are between these two extremes.

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